

Alberta Environment and Parks provides the following guidance for developers, subdivision authorities and development authorities to evaluate a development permit or subdivision application where the setback distances are planned or being considered for a reduction.

This guidance may be updated from time to time. Refer back to the latest publication for updates.

Introduction

Section 17 of the Subdivision and Development Regulation (SDR) under the *Municipal Government Act* defines the setback distance to a wastewater treatment facility, an operating landfill, a non-operating landfill, a waste storage site and a hazardous waste management facility.

Setbacks apply to developments specified in the SDR as residences, schools, or hospitals. The setback distances as listed in the Subdivision and Development Regulation are as follows:

- 300 metres to a wastewater treatment plant
- 300 metres to a non-operating landfill
- 300 metres to a storage site (non-hazardous waste transfer stations)
- 450 metres to an operating landfill
- 450 meters to a hazardous waste management facility

Setback distances to the specific developments act as a buffer from a wide range of factors, such as nuisance (odours, vectors and smoke) and contaminant migration (emissions, leachate and landfill gas). The distances can be reduced only if the factors mentioned are not present or the pathways are removed (i.e. mitigative measures).

The subdivision authority or development authority should notify AEP, if the setback distance is reduced for an operating waste facility.

Retroactive Approval for Existing Developments

When reviewing a development permit or subdivision application that includes a request to vary the setback distance for an existing development, the subdivision authority or development authority should consider information submitted by the applicant that is current (for example, produced within the last two years) in determining if the development is appropriate for a reduced setback distance.

If a reduced setback distance is not appropriate for an existing development, then the subdivision authority or development authority may refuse the request or may consider if additional terms and conditions to the development permit, such as additional mitigative controls, design changes, or additional investigations, may be required to mitigate any negative impact resulting from the reduction.

How to Vary the Setback Distance

This guideline applies to both specified developments encroaching on waste management facilities, and waste management facilities encroaching on specified developments.

For all types of waste facilities, the application for a reduced setback should include the following information:

- the types of waste stored, treated or disposed
- details about the facility operation including an aerial photograph or plan showing the facility as well as the setback measurements
- a visual inspection report for the facility
- a list of complaints related to the operation of the facility from the last two years
- an engineering report (specific to the waste facility) that includes a statement on if the reduced setback distance is feasible, and if any mitigative measures are required
- a certifying statement (see Appendix 1)
- if any mitigative measures are required, the design details, monitoring, and maintenance requirements for the mitigative measures

Monitoring data used to support the reduced setback should be current (produced in the last two years) or include a statement as to why the data is still representative.

Facilities with more than one activity

When applying to vary the setback distance for a facility with multiple waste activities at one location, details for each activity should be included in the application. For example, for a hazardous waste landfill, the application should include information outlined in both Section 2 on hazardous waste management facilities and Section 3 on landfills.

Figure 1 is a visual representation of the information required when there are two separate waste facility types within the proposed setback variance.

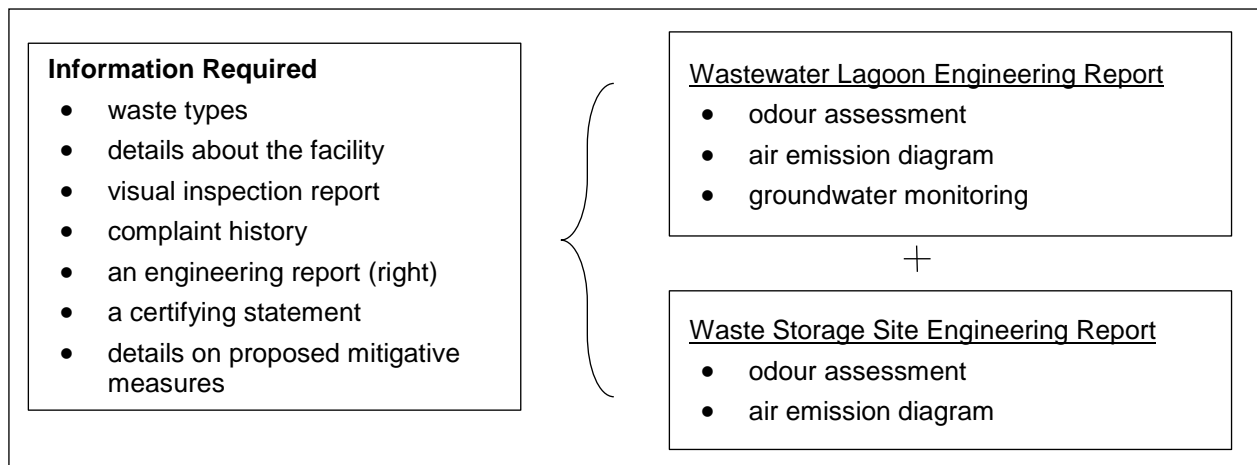


Figure 1: Visual representation of information requirements for a storage site and a wastewater lagoon

1. Wastewater Treatment Plant

A wastewater treatment plant is defined in the Wastewater and Storm Drainage Regulation (AR 119/1993), which states that a “wastewater treatment plant” is a structure, thing or process used for physical, chemical, biological or radiological treatment of wastewater, and includes a structure, thing or process used for:

- (i) wastewater storage,
- (ii) treated wastewater use and disposal, and
- (iii) sludge treatment, storage and disposal.

While wastewater is typically generated from domestic activities, by definition it includes both industrial wastewater and domestic wastewater. A wastewater lagoon is a wastewater treatment plant.

The engineering report, completed by a qualified professional, should include the following information:

- an odour assessment
- wind direction and air emission/odour plume diagram
- groundwater monitoring results, well logs, and an interpretation of the groundwater monitoring results, including but not limited to:
 - regional and site specific geology and hydrogeology
 - a map showing all water wells and residences within a 1 kilometre radius of the site and other topographical features, such as water bodies within 1.5 kilometres of the site, including if any of the water wells are used for human consumption

2. Hazardous Waste Management Facilities

A hazardous waste management facility is defined in the Waste Control Regulation (AR 192/1996), which states that a “hazardous waste management facility” means a facility for the collection, storage, treatment or disposal of hazardous waste, but does not include an on-site facility.

The engineering report, completed by a qualified professional, should include the following information:

- a review of the historical reports/issues associated with the operation of the facility (such as annual reports)
- groundwater monitoring results, well logs, and their interpretation, including but not limited to:
 - regional and site specific geology and hydrogeology
 - a map showing all water wells and residences within a 1 kilometre radius of the site and other topographical features, such as water bodies within 1.5 kilometres of the site, including if any of the water wells are used for human consumption
- an evaluation of the potential for, and magnitude of, adverse impacts on the environment and public health and safety within the setback distance for:
 - wind direction and air emission/odour plume diagram
 - air emissions (such as volatile organic compounds (VOC) and dust)
 - fugitive emissions
 - existing site contamination
 - VOCs in soil or groundwater
- pollution control measures implemented by the facility
- identify risks from site operations that may impact the proposed development

3. Landfills

A landfill is defined in the Waste Control Regulation (AR 192/1996), which states that a “landfill” is a waste management facility where waste is disposed of by placing it on or in land, but does not include a land treatment facility, a surface impoundment, a salt cavern or a disposal well.

The engineering report, completed by a qualified professional, should include the following information:

- delineation of waste placed (using test plots, historical aerial photographs)
- type of waste disposed (age, amount, depth of waste)
- duration of operation (actual or estimated if not available)
- landfill topography
- final topography showing site drainage
- if applicable, the landfill liner and final cover details (thickness and composition)
- the visual inspection report should include additional details of any visual notable landfill issues (such as: slope subsidence, vegetation stress, lack of vegetation, exposed refuse, or leachate breakout)
- a review of the available reports associated with the operation of the facility (such as annual reports)
- groundwater monitoring and sampling results, well logs, and an interpretation of the groundwater monitoring and sampling results, including but not limited to:
 - regional and site specific geology and hydrogeology
 - a map showing all water wells and residences within a 1 kilometre radius of the site and other topographical features, such as water bodies within 1.5 kilometres of the site, including if any of the water wells are used for human consumption
 - a map showing the extent of groundwater contamination
- subsurface landfill gas monitoring results

4. Storage Sites

A storage site is called a transfer station. A storage site is defined in the Waste Control Regulation (AR 192/1996). It is a waste management facility where waste is collected and held for removal to another waste management facility. The activities on these sites are limited to some physical treatment that includes: shredding, grinding, compacting and sorting.

The engineering report, completed by a qualified professional, should include the following information:

- an odour assessment
- wind direction and air emission/odour plume diagram

Other Waste Receivers

Non-hazardous waste facilities, such as composting facilities, which are actively receiving and storing third party waste as part of their operation may be considered storage sites with respect to maintaining a setback to select developments. Areas where final product or non-hazardous recyclables are stored are not considered working areas and no assessment is needed for these areas.

Setback Evaluation

The information provided in the application for a reduced setback should indicate:

- if the waste facility has nuisances
- details of any contamination contaminant migration (i.e. groundwater, landfill gas)

Delineation of contamination in both soil and groundwater is required in accordance with the Alberta Tier 1 Soil and Groundwater Remediation Guidelines and Alberta Tier 2 Soil and Groundwater Remediation Guidelines criteria, if present.

If these factors are present, the engineering report should include details for any mitigative measures that are in place (or will be in place) to ensure there are no pathways to the proposed development.

Mitigative Measures

If the setback reduction is approved and mitigative measures are used, the subdivision authority and development authority should ensure there is a process to ensure mitigation measures are monitored and maintained. If mitigative measures fail, this can present additional risks to the development and occupants. On-going monitoring and reporting of the mitigation measures may be required to ensure the mitigation controls remain effective.

Nuisance Assessment

If odours or vectors are present, then the reviewer should consider that a reduced setback might increase the complaints related to the existing conditions.

Out of Scope

This guidance does not include any information on the following:

- landfill setback distances for a water well under section 15 of the Nuisance and General Sanitation Regulation (AR 243/2003)
- requests that are intended to address multiple developments, previous variances, pre-existing developments, or blanket variances

Tracking

Development authorities should track when a setback variance has been issued with respect to the development permit or subdivision development application. The setback variance information should be retained and made available in the event of a property transfer to a new landowner.

Explosive Gas

If methane gas is produced by the waste facility (i.e. municipal solid waste landfill) and there is no natural barrier (such as a ravine), then the proposed development should not include underground infrastructure such as a basement. Gas migration does not correspond to groundwater flow and may be subject to preferential pathways such as sand or gravel lenses. Natural barriers do not include high groundwater or surface water ponds.

The evaluation of the methane monitoring results should be compared to existing guidance such as the Guidance Document on Management of Methane Gas Adjacent to Landfills, prepared for Alberta Environmental Protection by CG&S CH2M Gore & Storrie Limited. Seasonal monitoring should be considered to assess seasonal variations. The evaluation can include the following:

- Identify the presence of landfill gas, through a surface survey.

- Landfill gas monitoring probes should be installed in locations where a surface survey identify the presence of landfill gas.
 - Install wells into the waste to identify the locations of the landfill site to target for further landfill gas collection or other mitigation measures.
- If the landfill produces methane, landfill gas probes shall be place outside the waste footprint to measure for subsurface gas migration.
 - Install probes to a depth of one to two metres. See Appendix 2 for additional guidance on methane sampling.

Methane concentration of the landfill gas is assumed to be 50 per cent by volume. Additional information on gas monitoring is provided in Appendix 2. Landfill applications should reference Table 5.5 of the Standards for Landfills in Alberta for gas concentration considerations. A copy of the table is provided in Appendix 2.

The following table, Table 1, has been prepared for methane monitoring in soil, outside the waste footprint. For more specific monitoring at off-site buildings, refer to the Guidance Document on Management of Methane Gas Adjacent to Landfills.

It is recommended, when possible, that subsurface migration measurements are taken between 10 to 60 metres from the waste footprint and where preferential subsurface migration pathways are identified.

Table 1: Adapted from Guidance Document on Management of Methane Gas Adjacent to Landfills

Methane Concentrations (PPM)*	Gas Pressure, Additional Measurement	Development Considerations
0 – 100 ppm	Establish background levels	If concentration is not from background conditions underground infrastructure should not be developed
100 - 500 ppm	Indicator of potential LFG generation	If concentration is not from background conditions underground infrastructure should not be developed
500 - 5000 ppm	Indicator of potential LFG migration	Recommend no underground infrastructure; consider building monitoring to detect LFG
> 5,000 ppm	Measure and monitor soil gas pressure (see Appendix 2)	Recommend no underground infrastructure consider building monitoring to detect LFG and increased subsurface LFG monitoring
>50,000 ppm	Measure and monitor soil gas pressure, LFG pressures should be below 0.25 kPa near any off-site buildings	Recommend no underground infrastructure; monitor at neighbouring building footing with continuous LEL monitoring of adjacent buildings recommended; additional LFG collection controls at landfill should be considered to prevent migration

ppm – part per million

LFG – Landfill Gas

kPa – kilopascals

* 500 ppm = 1 per cent Lower Explosive Limit (LEL) (for methane) [20 per cent LEL = 1 per cent Landfill Gas.]

Groundwater Contamination

If the waste facility has produced contamination in groundwater, the engineering report should include an evaluation of the associated risk to the specified development. Any contamination that exceeds the Table 2 of the Alberta Tier 1 Soil and Groundwater Remediation Guidelines for residential use at the facility property boundary should be remediated or mitigated before a setback variance is granted. Additional information on groundwater monitoring is provided in Appendix 3.

Landfill Specific Considerations

Operating/Non-Operating

Landfills may be in various states of closure or post-closure, which is also called reclamation. Once the landfill no longer accepts and disposes of waste, the landfill is non-operating. If the landfill facility continues to receive and dispose of waste, it is operating. When there is an area of the landfill that has been closed, but the landfill remains operating, the landfill as a whole is considered operating.

Remediation/Reclamation

For landfills that have been mined and the waste has been removed, the surrounding areas should be monitored for any remaining effects from the waste. The setback distance remains in effect until such time that a remediation certificate has been issued.

Reclamation certificates are not available. Only a remediation certificate may be available for waste management facilities if all the waste and effects associated with the disposal of the waste is first removed and analysis of the soil and groundwater confirms this.

Working Area/ Disposal Area

The working area includes areas where waste may be, or have been, burned¹, processed or stored, whereas a disposal area is where waste has been placed onto or into the land as its final resting place, but also includes the working areas until the site is no longer operating. The building site and property line are measured slightly differently depending on the type of development application. For historical landfills, if the waste footprint has not been delineated, the property line should be used to measure the setback distance for the disposal area, until the disposal area is delineated.

Appendix 4 contains a checklist for landfills.

¹ Open burning of municipal solid waste is prohibited; however, the burning of clean wood waste may in some cases still occur at the facility. Areas where burning occurs at a waste facility are considered the working areas of the facility.

Appendix 1: Certification Statement

This page can be printed and included with the application

“STATEMENT PAGE”

APPLICATION FOR A SETBACK VARIANCE

Project Name _____

Location _____

Municipality _____

I acknowledge that I have reviewed the Guideline for Setback Reviews and certify that the project complies with all of the requirements and guidelines specified for the development, and the risks have been evaluated and disclosed within the application.

SIGNED AND STAMPED by a qualified professional.

NAME _____

COMPANY _____

For projects that do not comply with all of the guidelines please submit a detailed explanation of the deficiency and why it is, in your professional opinion, necessary.

Appendix 2: Landfill Gas Detection and Landfill Gas Subsurface Migration

Additional details on methane measurements can be found in Section 3 of the Guidance Document on Management of Methane Gas Adjacent to Landfills, prepared for Alberta Environmental Protection. prepared by CG&S CH2M Gore & Storrie Limited, 1999 as amended.

Landfills should reference Table 2 below, an excerpt from the Standards for Landfills in Alberta, for the measurement of gas concentrations.

Table 2: Table 5.5 from the Standards for Landfills in Alberta

Sampling Location	Explosive Gas Limits
<ul style="list-style-type: none">In the subsurface at the property boundary	50 % LEL
<ul style="list-style-type: none">In an on-site building or enclosed structureIn the area immediately outside the foundation of the building or structure	20 % LEL
<ul style="list-style-type: none">In an off-site building or enclosed structureIn the area immediately outside the foundation of the building or structure	1 % LEL

For subsurface gas detection, gas probes are installed into the subsurface using an auger or drill rig. The probe installation requires the inclusion of a sample port and valve. A protective outer casing is required similar to groundwater monitoring wells.

Only qualified and trained personnel should install and sample landfill gas probes.

When measuring subsurface gas migration, there are five steps (in this order):

- Measure probe pressure
- Checking the entire sample train for leaks
- Purge the probe piping
- Read and record gas composition
- Reseal the probe once monitoring is complete

To measure the pressure use the following methods:

- U-tube or digital manometer
- Differential Pressure Gauge
- Electronic Pressure Gauge

After the pressure readings are collected, a sample of the methane or a representative sample can be taken and analyzed, using one of the following methods.

- Handheld detectors (with a sampling ports)
 - Flame ionization detector
 - Thermal conductivity detector
 - Catalytic combustion sensor
- Canister sample for laboratory analysis (follow the laboratory instructions).

Field data collection should include:

- methane, carbon dioxide, oxygen concentration and hydrogen sulphide, (if a handheld detector is used)
- barometric pressure
- ambient temperature
- the probe gas pressure

Hydrogen sulphide (H₂S) can be present in landfill gas. It may be important to include as a monitoring parameter. If H₂S is present, personal protective equipment should include an H₂S monitor for all field sampling personnel.

Additional Useful References

Procedure D-4-1 “Assessing Methane Hazards from Landfill Sites”. Ministry of Ontario, (Updated March 22, 2019)

Appendix 3: Groundwater Monitoring Wells

Water well drilling activity is regulated in Alberta under the *Water Act*, the Water (Ministerial) Regulation (AR 205/1998). Drillers installing wells for the purpose of collecting groundwater data must obtain a Class C approval and are required to follow the applicable provisions of the Water Wells and Ground Source Heat Exchange Systems Directive.

Groundwater monitoring wells for the purpose of assessing the presence or absence of contamination should be located at least 10 metres but not more than 60 metres, from the waste footprint. Site-specific hydrogeology should be used to select the length and vertical position of the monitoring well screen.

All sampling and testing must be conducted by qualified professionals. Field measurement should include:

- The water level measurement and water elevation
- Thickness of any LNAPPL (e.g. layers), if present
- pH
- Electrical Conductivity
- Temperature

The laboratory analysis should include, but not be limited to:

- pH
- Total Dissolved Solids (TDS)
- Alkalinity
- Ammonia
- Total Kjeldahl Nitrogen
- Nitrate – N
- Nitrite – N
- Electrical Conductivity
- Hardness (as CaCO₃)
- Chlorides
- Calcium
- Magnesium
- Sodium
- Potassium
- Sulphate
- Dissolved Organic Carbon (DOC)
- Iron
- Manganese

Depending on the type of wastes managed at the waste facility, additional parameters should be included. This can include hydrocarbons such as BTEX and other VOCs, and/or Total Metals.

Landfill applications should reference Table 5.2 of the Standards for Landfills in Alberta for the parameters in groundwater monitoring analysis.

Appendix 4: Checklist for Landfills

Considerations for Consent		Condition	
		Yes	No
Consent should not be considered when all three of the following conditions exist:			
a.	gas levels above background are present within the waste disposal area of the landfill		
b.	the land area where development is to occur has no natural physical barrier to gas movement		
c.	the development has underground infrastructure or basements		
Where groundwater has been contaminated, consent should only be considered where:			
a.	potable water to the proposed development is being supplied from a municipal system		
b.	vegetation, or other receptors, or property will not be affected by the contaminated groundwater		
Information Requirements		Provided	
		Yes	No
An engineering report, completed by a qualified professional that includes, as a minimum:			
a.	landfill cell delineation including approximate waste depths		
b.	duration of operation		
c.	amount, types of waste, and degree of waste stabilization in the landfill		
d.	landfill topography for site drainage		
e.	landfill final cover details such as thickness and composition		
f.	a visual inspection report that details vegetation stress and degree of cover, landfill settlement, exposed refuse, leachate breakout, and any other visually notable landfill issues		
g.	a review of the available reports/issues associated with the operation of the facility (such as annual reports)		
h.	regional and site specific geology and hydrogeology		
i.	a map showing all water wells and residences within a 1km radius of the site and other topographical features, such as water bodies, within 5km of the site		
j.	the applicable sections of the area structure plan documenting the zoning and expected use of the landfill and surrounding area		
k.	well logs and groundwater monitoring and sampling results		
l.	landfill gas monitoring results		
m.	an opinion on whether encroachment is feasible (under what mitigative measures, to what distance)		
n.	if mitigative measures are proposed, the design details, monitoring and maintenance program for the mitigative measures		